NON-PUBLIC?: N
ACCESSION #: 9004200305
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Millstone Nuclear Power Station PAGE: 1 OF 4
Unit 3

DOCKET NUMBER: 05000423

TITLE: Reactor Trip Due to Turbine Trip Due to High Stator Coolant Temperature
EVENT DATE: 03/09/90 LER #: 90-009-00 REPORT DATE: 04/09/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mark A. Smith TELEPHONE: (203) 447-1791
Engineer, Ext 4841

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: TJ COMPONENT: TCO MANUFACTURER: F120
X TB RLY D141
REPORTABLE NPRDS: Y
Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On March 9, 1990, at 1653 hours, while operating in Mode 1 at 100% power, 2250 psia and 587 degrees Fahrenheit, an automatic turbine trip with subsequent reactor trip occurred due to high Stator Cooling Water temperature.

The cause of the event was the failure of the mechanical linkage on the Fischer & Porter controller for the Stator Cooling Water temperature control valve due to wear at the linkage connections. The root cause of the event was inadequate design, in that the temperature controller is mounted directly on the temperature control valve, The wear found on the mechanical linkage of the controller was induced from vibration of the

temperature control valve.

As short term corrective action, the failed controller was replaced with a spare of the same model. The actions to prevent recurrence include replacing the original model controller with a more reliable controller with manual over-ride capabilities, and relocating the new controller to an area of low vibration.

END OF ABSTRACT

I. Description of Event

On March 9, 1990, at 1653 hours, while operating in Mode 1 at 100% power, 2250 psia and 587 degrees Fahrenheit, an automatic turbine trip with subsequent reactor trip occurred due to high Stator Cooling Water temperature.

At 1647 hours on March 9, 1990, the operators received a Stator Coolant outlet high temperature alarm. A Second Stator coolant pump, 3GMC-P1B, was started and a non-licensed operator (PEO) was dispatched to investigate both the Stator Cooling system and the heat exchanger secondary supply water system temperature. At 1650 hours, the operators received a Stator Coolant inlet high temperature annunciator alarm. The PEO noted that the Stator Cooling temperature controller, 3GMC-TIC36, had failed to the low temperature direction, which resulted in a full bypass of the heat exchangers. He attempted to manually manipulate the failed linkage, but was unsuccessful. The Stator Coolant pumps were switched from the A to the B pump at this time. At 1651 hours, the operators received a Stator Coolant protective circuit energized alarm, and the A Stator Coolant pump was restarted. At 1653 hours, the turbine tripped, without a turbine runback occurring. With the plant greater than 50% power, an automatic reactor trip signal resulted upon receipt of the turbine trip signal. At the time of the reactor trip, operators verified that both reactor trip breakers opened, that all rods were at the bottom and that neutron flux was decreasing. A Feedwater Isolation occurred, which is a normal plant response following a reactor trip. No other safety signals were expected or received. There were no operational, maintenance, or construction activities in progress at the time of the event that affected the event. No safety systems were out of service or in off-normal status at the time of the event and there were no failures of any safety-related equipment. Plant stability, based on average Reactor Coolant temperature, was achieved at 1713 hours on

March 9, 1990.

II. Cause of Event

The cause of the temperature controller malfunction was equipment failure due to induced vibration wear. The root cause of the event was inadequate design, in that the location of the temperature controller is not conducive to reliable operation of the temperature controller for the Stator Cooling Water system,

The mechanical linkage on the controller, 3GMC-TIC36, for the Stator Cooling Water temperature control valve, 3GMC-TV36, failed due to wear at the linkage connections. The temperature controller is mounted directly on the temperature control valve. The wear found on the mechanical linkage of the controller was induced from vibration of the temperature control valve. The linkage failure caused the temperature indicator to fail low, indicating low Stator Cooling Water temperature. This caused the temperature control valve to a shift to full bypass position, allowing the Stator Cooling Water to bypass the Stator Cooling Water heat exchangers, 3GMC-E1A and 3GMC-E1B. As a result, Stator Cooling Water temperature rose above its setpoint of 79 degrees Centigrade, initiating the turbine load set runback circuit. The two-minute timer was started in the turbine load set runback circuit, and with stator current above the 25,783 ampere limit, the turbine generator tripped.

The purpose of the two-minute timer in the turbine load set runback circuit is to allow a reduction below 25,783 amperes in two minutes from the onset of a high temperature indicator in the Stator Cooling Water system. For this event, the high temperature indication did initiate the two-minute timer. However, the turbine load set runback did not occur and load was not reduced from full load. A relay in the turbine load set runback circuit was identified as being defective, preventing a turbine runback.

III. Analysis of Event

This event is reportable pursuant to 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System. Immediate notifications were made in accordance with 10CFR50.72(b)(2)ii).

There were no significant safety consequences due to this event. The components that failed, Stator Cooling temperature controller, 3GMC-TIC36, and the turbine load set runback circuit are not required to perform any safety function, nor di
their failure
prevent any of the plant's safety systems from performing their intended safety functions.

The turbine runback circuitry is intended to provide a pre-emptive means to preclude generator stator winding damage. To accomplish this, the runback circuit automatically reduces armature current (i.e., to decrease the load) without causing a turbine trip-reactor trip condition. With the runback circuit failure, generator protection was provided by the Stator Coolant high temperature turbine trip. Whenever the plant is above 50% power, a turbine trip will cause a reactor trip (because the instantaneous load rejection capability of the turbine bypass valves - steam dumps and the rod control system would be exceeded). The turbine trip-reactor trip protection circuitry is not a safety grade feature, It is designed to occur prior to the initiation of safety grade reactor trips on either overtemperature delta temperature (OT DELTA T) or overpower delta temperature (OP DELTA T). The (OT DELTA T) trip limit prevents an excessive mismatch between turbine load and reactor power to minimize undesirable reactor coolant thermal excursions. The OP DELTA T reactor trip provides assurance of fuel integrity from core overpower conditions.

IV. Corrective Action

Once the plant had been stabilized in Hot Standby (Mode 3), the Stator Cooling Water temperature controller, 3GMC-TIC36, was replaced with an exact replacement.

In order to increase the reliability of the Stator Cooling Water temperature controller and to prevent recurrence, the following actions will be taken:

1. Relocate the temperature controller to an area of low vibration.

2. Replace the existing temperature controller with a new (Fisher Model 43AP) type controller of improved design, which will allow for manual temperature control valve, 3GMC-TV36, operation.

The defective relay in the turbine load set runback circuit has been

replaced with an exact replacement, and the entire load set runback circuit was tested, with acceptable results. The generator manufacturer (General Electric) has been contacted to evaluate whether any damage has been incurred as a result of this event.

V. Additional Information

There have been no similar events with the same root cause and sequence of events.

Routine turbine runback circuit surveillances are performed every refueling outage to verify satisfactory performance. Based on the previous satisfactory surveillances and the fact that the aforementioned relay failure is the first identified in the plant's operating history, the relay failure is considered random and isolated.

The Stator Cooling Water temperature indicating controller was manufactured by Fischer & Porter Company and is a Model 1451. The failed runback circuit relay is a Deutsch model E210-1173.

EIIS Codes

System

Main Generator Stator Cooling System - TJ

Component

Temperature Controller - TC

Relay - RLY

Temperature Control Valve - TCV

NORTHEAST UTILITIES
The Connecticut Light And Power Company
Western Massachusetts Electric Company
Holyoke Water Power Company
Northeast Utilities Service Company
Northeast Nuclear Energy Company

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April 9, 1990
MP-90-352

Re: 10CFR50.73(a)(2)(iv)

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Reference: Facility Operating License No. NPF-49
Docket No. 50-423
Licensee Event Report 90-009-00

Gentlemen:

This letter forwards Licensee Event Report 90-009-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the & Reactor Protection System (RPS).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace
Director, Millstone Station

SES/MAS:ljs

Attachment: LER 90-009-00

cc: T. T. Martin, Region I Administrator
W. J. Raymond, Senior Resident Inspector,
Millstone Unit Nos. 1, 2 and 3
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3

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